

RECOVERY OF HEAVY OILS THROUGH IN-SITU COMBUSTION PROCESS

ABSTRACT OF THE DISCLOSURE

An in-situ combustion process heats an oil-bearing formation so as to reduce the viscosity of heavy oil, and/or to extract oil from solid or semi-solid materials in the formation. Oxygen-enriched air for the combustion is generated non-cryogenically at the surface, preferably with a membrane system or a pressure swing adsorption (PSA) unit. The oxygen-enriched air may be blended with other air to adjust its oxygen content, and is then compressed at the surface, and conveyed into an injection well. The oxygen-enriched air is especially intended for use in a toe-to-heel in-situ combustion process, in which combustion proceeds along a horizontal well. Nitrogen resulting from the production of the oxygen-enriched air may be used to compress the oxygen-enriched air, or for other purposes.